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AN OBSERVATION ON THE NUMBER OF BACTERIA IN DES MOINES SCHOOL BUILDINGS.

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At the request of the President of the Polk County Medical Society in November of last year, 1905, I made a little investigation into the bacteriological conditions of the school buildings of Des Moines.

Because of circumstances the work was hurriedly undertaken, and because of that fact, was more crudely done than it otherwise would have been. Not having apparatus available for the determination of the number of bacteria in a measured quantity of air, and not having time to prepare such apparatus, it was necessary that the method adopted should be the rather crude one of exposing Petri dishes in the air of the school rooms for a definite period of time. It was also necessary that these dishes while being exposed, could not be under direct observation, consequently I do not know that in all instances they were all undisturbed although I believe such to have been the case. For these reasons, then, it will be readily understood that results obtained can be considered only as approximate instead of being scientifically accurate. For a period of thirty minutes a Petri dish containing ordinary gelatine medium was exposed in each building, in the room that was the most crowded with pupils. At the beginning of the exposure of the dishes in the rooms selected for the purpose, the teachers gave the pupils a marching drill, or calisthenics—with one exception, that being in the case of the room in the West side high school in which the request was not made— in order that the dust of the room should be put into circulation. Teachers were requested to replace the covers on the dishes at the end of the allotted time and take them to the principal's office.

Upon the return of the gelatine dishes to the laboratory they were placed in the incubator room and kept at room temperature for a period of forty-eight hours, with the exception of some of the dishes, which unavoidably were permitted to stand sixty hours before the count of the colonies was taken. If the dishes had been permitted to incubate longer, the probability is that a larger number of colonies would have developed. As has already been stated, the determination of number per cubic meter could not be made by the method employed. The number of colonies on the gelatine plates exposed in the different buildings is as follows:

Benton, Room 1,	1,150
Bryant, Room 10,	504
Curtis, Room 5,	963
Bremer, Room 1,	375
Emerson, Room 5,	1,320
East High Assembly Room,	386
East High Toilet, Girls,	478
Lucas, Room 4,	784
Webster, Room 8,	435
Longfellow, Basement	695
Longfellow, Room 1,	415

This makes a list of the buildings in East Des Moines in which dishes were exposed.

The number of colonies on the plates exposed in the different buildings in West Des Moines is as follows:

Franklin, Room 7,	353
Irving, Room 5,	253
Bird, Room 5,	323
West High, Room 11,	93
Lincoln, Room 2,	460
Summit, Room 3,	235
Forrest, Room ?	355

The incubation period in the following buildings was sixty hours instead of forty-eight:

McKinley, Room 2,	325
Washington, Room 8,	615
Oakland, Room 10,	425
Garfield, Room 4	151
Crocker, Assembly Room	198
North High, Troutner Room	129

Leaving Room 11 of the High school out of the calculation the average number of colonies per dish exposed in the West side buildings was 322; in the East side buildings 677. With these counts as a basis I find that just after the dust of the rooms is put into circulation by the children marching, the bacteria fell to the floor at the rate of 7403 on one square foot of floor surface in one hour of time in the West side buildings and at the rate of 15570 on same area in same time in East side buildings. Considerable variation in numbers is noticeable in different buildings, the smallest number in any West side building being 129 the largest 615. In the East side buildings the corresponding numbers are 375 and 1320. Of course conditions of exposure of the dishes could not be identical in the various buildings. The location of the building affects, in considerable degree, the number of germs in the air. The fact that conditions under which the dishes were exposed could not be identical makes it evident at once that the number of colonies in the different buildings is not to be taken as an exact measure of the efficiency of the janitor service in the various buildings. Yet it does indicate with a greater or less degree of accuracy the relative condition of the rooms at the time when the exposures were made. The number of colonies developing in the dishes exposed in the East side buildings is approximately two times as great as the number of colonies developing in the dishes exposed on the West side. I attribute this difference to a great extent to the fact that the floors of the West side buildings are oiled, while those on the east side are not. Bacteria are heavier than air and consequently tend to fall to the ground or floor. If the surface of the floor is such that the dust and the bacteria adhere, then movement in the room as a natural consequence will fail to put much of the dust into circulation. No better illustration of the sticking of dust to an adhesive surface can be given than John Tyndall's classical experiment in 1876. If the surface of the

floor is moist, then the bacteria will adhere. So long as the dust and bacteria are moist they will not be taken up to any very great extent from the surface by ordinary air currents. It has been known for a number of years that the air in sewers is much more nearly pure bacteriologically than is the air of the street. It is not necessary to state that in order to keep the air of the school room as nearly free from bacteria as possible, the floor, the walls, and furniture must be kept as thoroughly cleansed from dust as practicable.